CCSU
DEPARTMENT OF MATHEMATICAL SCIENCES

COLLOQUIUM

Friday, March 7
2:00 – 3:00 PM
Maria Sanford, Room 101

THE LOWER BOUND FOR THE DIRICHLET EIGENVALUES IN A WHOLE HYPERBOLIC SPACE

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Abstract: In this presentation we analyze the lower bound estimation for the eigenvalues $\lambda's$ in the Dirichlet eigenvalue problem in the whole Hyperbolic space $H^{n.}$. I.e., we consider the following system

$$\begin{cases} \Delta\, \varphi_\lambda(v,r) + \lambda\varphi_\lambda(v,r) = 0 \quad \forall\, r \in [0,\infty), \qquad \lambda \in R \\ \varphi_\lambda(v,r) \longrightarrow 0 \;\; as \;\; r \longrightarrow \;\; \infty\,, \end{cases}$$

Where v is a point of the unit k-dimensional sphere centered at the origin and r is the geodesic distance between a point in $\boldsymbol{H^{n.}}$ and the origin, i.e**.,** (v,r) are the geodesic polar coordinates.

We already saw in one of my previous presentations that if $\varphi_\lambda(v,r) = 0$ for some r and for every v, then

$$\lambda \geq \frac{-\kappa(n-1)^2}{4} + \frac{\pi^2}{(2r)^2}.$$

Can this inequality be useful to estimate the lower bound for the eigenvalues in the Dirichlet Eigenvalue Problem stated above? We shall see that the answer is no. However, we shall also see that for every $\lambda > 0$ the system has a non-trivial solution. If we assume that $\varphi_\lambda(v,0) = 1$, then Zero will be the lower bound for the eigenvalues in the problem above. Whether one can get rid of such an assumption, is an open question.

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